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Exploring 21st Century Skills and Learning Environments for Middle School Youth

Annahita Ball

University at Buffalo, State University of New York, annahita@buffalo.edu

Hillary D. Joyce

Auburn University, hdj0002@auburn.edu

Dawn Anderson-Butcher

Ohio State University - Main Campus, anderson-butcher.1@osu.edu

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Exploring 21st Century Skills and Learning Environments for Middle School Youth

Abstract

Resiliency research and strengths-based perspectives highlight the importance of understanding the protective factors that aid youth in overcoming adversity. Likewise, current research identifies the characteristics and skills youth need to be successful in post-secondary education and the workforce. These growing bodies of research emphasize cognitive and noncognitive skills that support youth development and academic success. This exploratory study sought to develop two distinct measurement instruments: (1) the 21st Century Life & Career Skills scale (21C-LCS); and (2) the 21st Century Skills Classroom Environment scale (21C-CE). We also examined students' perceptions of their own skills in these areas. The measures were developed and tested using survey data from 262 middle school students. Exploratory Factor Analysis was used to examine the factorial structure of the measures and descriptive statistics were used to summarize student perceptions. Results indicated that the 21C-LCS and the 21C-CE are brief psychometrically sound measures. The 21C-LCS assesses students' leadership and responsibility; working with others effectively; and, adaptability. The 21C-CE is a reliable measure of students' perceptions of the ways in which their classroom environments support their development of 21st century life and career skills. Students reported moderately high perceptions of their skills in all areas. This study is an important step in measuring 21st century life and career skills and 21st century learning environments. Researchers, youth development professionals, educators, and other service providers can utilize these measures in ongoing investigation, assessment, and progress monitoring to foster and advocate for 21st century life and career skill development among youth.

Keywords

21st century skills, scale development, life and career skills, learning environment

Exploring 21st Century Skills and Learning Environments for Middle School Youth

Resiliency research and strengths-based perspectives point to the importance of understanding the protective factors that aid youth in overcoming adversity (Delgado, 1997; Zolkowski & Bullock, 2012). Other researchers across a number of disciplines (e.g., education, social work, psychology) have examined the specific characteristics and skills youth need to be successful in post-secondary education and the workforce (Strayhorn, 2011; Unrau, Font, & Rawls, 2012). Collectively, these growing bodies of research highlight an emphasis on a number of cognitive and noncognitive skills that support academic success. Recently, however, attention has focused on empirical evidence indicating the importance of non-cognitive skills in successful youth development (Heckman & Rubenstein, 2001; Lleras, 2008; Park, 2004). Schools, positive youth development programs, and workforce development initiatives are turning to these skills, sometimes broadly referred to as *skills for success* (Tooley & Bornfreund, 2014), to inform program development and guide interventions designed to improve youth outcomes. Additionally, the much-debated national Common Core State Standards (CCSS) in the United States emphasize integrating non-cognitive skills in curricula and instruction (CCSS Initiative, 2014). School social workers are often integral in providing services and programs that enhance non-cognitive skills (Frey et al., 2012; Kelly et al., 2010); thus, it is critical that social workers engage in research and practice discussions about these initiatives. This manuscript reports on the development of two measures that assess students' perceptions of non-cognitive skills, specifically those identified as *21st Century Skills*, as well as reports a summary of findings from one sample of middle school youth.

Non-Cognitive Skills

Non-cognitive skills are often characterized as character strengths or developmental assets. Character strengths refer to a core set of attributes or abilities and include characteristics such as motivation, delayed gratification, self-discipline, and grit (Duckworth & Quinn, 2009; Duckworth, Peterson, Matthews, & Kelly, 2007; Mischel, 1996; Peterson & Seligman, 2004). Character strengths arose from Peterson and Seligman's (2004) initial Values in Action (VIA) model that included 24 universal strengths. Since its development, VIA has been used as a guiding framework for several measures of character strengths, including the Values in Action Inventory of Strengths for adults and the Values in Action – Youth (VIA-Y) for child strengths (Park & Peterson, 2005). The VIA-Y assesses youths' perceptions of the same 24 universal strengths in the VIA model (e.g., curiosity, creativity, kindness, zest). Recent studies found that these strengths are related to life satisfaction, happiness, and positive affect (Proctor et al, 2011; Toner et al., 2012)

Developmental assets are another component of non-cognitive skills for youth. These assets refer to building blocks of healthy development and serve as

protective factors for youth as they face adverse outcomes (Benson, 2003; Search Institute, 2006). Assets may be internal, such as self-esteem, decision-making skills, and responsibility, or external, such as support from others, safe environments, and positive interaction patterns with others (Bensen, 2003; Search Institute, 2006). Together, internal and external assets have a positive influence on children's lives, as research indicated that youth who had multiple assets were more engaged in school, demonstrated leadership qualities, participated in fewer risky behaviors, and had greater academic success (Lerner & Benson, 2003; Murphey, Lamonda, Carney, & Duncan, 2004).

At the same time, there has been a push to ensure youth have the skills required to compete and succeed in today's workforce. This push is due to reported concern from employers regarding the gap between academic preparation and workforce skills (Cassell & Kolstad, 1998; Olson, 2006a; P21, 2008; Sparks & Waits, 2011). Specifically, the demand is growing for skills such as teamwork, creativity, strong work habits, and social skills (Barton, 2006; Olson, 2006b; Achieve, 2012). As such, in addition to character strengths and developmental assets, there is a movement toward fostering in youth what are called 21st century skills to ensure youth are prepared to compete in the changing workforce.

21st Century Skills

Despite the increased push for schools to develop 21st Century skills among youth, scholars have had difficulty identifying these core skills. For instance, a recent review of literature on 21st Century Skills indicated little consensus on the core skill areas and definitions of specific skills (Lai & Veiring, 2012). Still, a number of institutions, such as the Partnership for 21st Century Skills (P21), the American Association of School Librarians (AASL), and the International Society for Technology in Education (ISTE) offer frameworks and guidelines that outline the core skills needed to meet the challenges of the modern age. While there are differences across the three proposed frameworks, several similarities emphasize the need for focus on a set of three main categories of skills: learning and innovation (e.g., creativity, critical thinking, collaboration); information, media, and technology (e.g., digital literacies); and life and career skills, the focus of this paper (P21, 2009).

Life and career skills encompass key skills necessary for students to live and work in diverse, complex environments. These include: leadership; time management; initiative and self-directed learning; and working with others effectively. More specifically, leadership skills involve guiding others, identifying and employing the strengths of others, and motivating others to accomplish a common goal (P21, 2009). Time management includes utilizing time and managing workload efficiently (P21, 2009). Initiative and self-directed learning are skills defined by behaviors such as goal-setting with measureable criterion for success, establishing a balance between long and short term goals, and exploring new learning opportunities (P21, 2009). Working with others effectively includes one's

ability to interact effectively with others including knowing when to contribute, when to listen, and respecting different values and opinions (P21, 2009).

Life and career skills are the focus of this paper; as they represent non-cognitive skills that have the potential to improve academic achievement, promote postsecondary success, and foster career readiness. Collaborating and working effectively with others can have a lasting positive impact on individual student learning (Saner et al., 1994) and increase social competency (Ginsburg-Block, Rohrbeck, & Fantuzzo, 2006). Motivation, a research construct often related to life and career skills such as flexibility, is also related to academic achievement (Broussard & Garrison, 2004) and motivation contributes to resilience in youth (Masten, 2001). In addition, possessing life and career skills enhances future employability given the high value and priority employers are placing on skills such as the ability to work on a team and time management (Barton, 2006). Given the numerous benefits, assessing and developing life and career skills among youth is important. Further, the development of these skills may be facilitated across youth settings such as schools, afterschool, sports, and youth employment. These contexts represent opportunities for youth to practice 21st century skills, which is critical to 21st century skill development (P21, n.d.; AASL, 2007). Understanding 21st century skills is not sufficient to support children's acquisition of such skills. It is also important that children have the opportunity to practice these skills, thus, a learning environment that fosters 21st century learning is likely essential; however, little is known about the opportunities youth have to practice 21st century skills.

In summary, 21st century skills represent characteristics students should possess to overcome adversity and achieve success in postsecondary education and the workforce. Instruments are needed to assess these important characteristics (Silva, 2009). This study aimed to develop a psychometrically sound measure of several core 21st century life and career skills for use with children and youth. We also assessed the degree to which students have opportunities to practice 21st century life and career skills in their learning environments. Finally, we explored the extent to which youth reported possessing 21st century life and career skills.

Method

Two distinct measures were developed for this study - the 21st Century Life & Career Skills scale (21C-LCS) and the 21st Century Skills Classroom Environment scale (21C-CE). All steps for development of the two scales were based on the recommendations of DeVellis (2003). The Institutional Review Board at The Ohio State University approved this study.

Instrument Development

21C-LCS. Following a thorough review of the literature, we initially developed a pool of 26 items to measure skills within the 21st century skill domain of *life and career skills*. Specifically, we drew from two existing frameworks of

21st Century Skills – one developed by the Partnership for 21st Skills (2009) and one developed by the National Research Council's Committee on the Assessment of 21st Century Skills (National Research Council, 2011). Items were developed to assess the skills highlighted within the life and career skills (Partnership for 21st Century Skills, 2009) and intrapersonal skills (National Research Council, 2011) domains of these two models. These included skills such as leadership, adaptability, goal-setting, self-regulation; social and cross-cultural skills, and productivity and accountability. All items utilized a 5-point Likert-type response scale (1=*Not at all true*; 5=*Really true*). Example items include: "I lead others to accomplish a goal," "I control my temper when working with others on a project," and "I think about how others see things."

21C-CE. Nine items were developed to measure students' perceptions of their classroom environments in relation to the 21st century life and career skills identified in existing frameworks (P21, 2009; Committee on the Assessment of 21st Century Skills). All items utilized the same 5-point Likert-type scale from the 21C-LCS. Example items include: "My teachers give me the opportunity to lead groups" and "My teachers help me set goals for myself."

Data Collection Procedures and Sample

Data were collected on the newly-developed 21C-LCS and 21C-CE using a cross-sectional survey research design within one urban middle school in the Midwest. The sample included 262 students in grades 6 (35.8%), 7 (35.8%), and 8 (28.4%). All participants had parental consent to participate in the study. The sample was almost evenly split by gender, with 50.8% of the participants reporting as male and 49.2% reporting as female. Half of the participants reported as Black/African American, 25.7% as White, 21.6% as multi-racial, 1.2% Latino(a), and 1.2% as Asian.

Data Analysis

To address the first and second study objectives, we utilized two separate exploratory factor analyses (EFA) to identify the number of factors within the 21C-LCS and the 21C-CE. One EFA was conducted with principal axis factoring and promax rotation for each of the scales. First, we applied the Kaiser-Guttman retention criteria and examined the scree plots to retain factors that had eigenvalues greater than 1.00 (Tabachnik & Fidell, 2007). Next, we screened item factor loadings on the pattern matrix to identify factor loadings that fit the retention criteria established by Comrey and Lee (1992). Specifically, items with factor loadings greater than 0.45 were retained in this analysis. After examining individual factor loadings, we identified factors and named them depending on the conceptual constructs they assessed. Existing frameworks of 21st century skills were also considered to assess the conceptual fit of items and factors. Cronbach's alpha was used to assess the internal consistency of the items within each factor and of the scale as a whole. Descriptive statistics and bivariate correlations were used to

explore the extent to which youth report possessing 21st century life and career skills and their perceptions of their learning environments.

Results

Factor analysis was deemed appropriate for each scale given significant ($p < 0.01$) Bartlett's (1954) Tests of Sphericity and Kaiser-Meyer-Olkin Measure (KMO; Kaiser, 1974) values of 0.91 and 0.88. The results of each analysis will be described here, followed by a summary of descriptive and correlational results.

21C-LCS

The initial run of the EFA indicated that the 26 items of the 21C-LCS resulted in a 6-factor solution accounting for 61.16% of the total variance. An examination of the scree plot and factor loadings indicated that two factors were not well-defined and nine items cross-loaded on multiple factors. As such, these nine items were eliminated and the EFA was conducted again to identify the most parsimonious solution. The results of the second EFA indicated that the remaining 17 items included four factors accounting for 60.32% of the total variance. Two items did not sufficiently load on any of the four factors and two additional items cross-loaded on multiple factors. The four problematic items in this run of the EFA may have been somewhat ambiguous in relation to context for middle school participants (e.g., "I focus my attention"). The decision was made to eliminate these four items and run the EFA again. In this third run, the results indicated a four-factor solution accounting for 67.34% of the total variance. Two items cross-loaded on multiple factors and were removed as well. The results of the fourth run of the EFA with the remaining 11 items resulted in three underlying factors accounting for 62.15% of the variance. The factor loadings from the pattern matrix, descriptive statistics, and reliability information for the 21C-LCS are outlined in Table 1.

Factor 1 included five items that accounted for 37.17% of the variance and was labeled *Leadership and Responsibility*. All of the items in this factor indicate students' perceptions of their ability to lead others and accomplish goals. The second factor, labeled *Working with Others Effectively*, included four items and accounted for 13.74% of the variance. This factor describes students' perceptions of the extent to which they listen to others and consider differing perspectives and cultures. The third factor was labeled *Adaptability* and is a measure of students' perceived adjustment and openness to change. Factor 3 accounted for 10.70% of the variance and included two items.

Table 1. Items, factor loadings, and descriptive statistics for the 21C-LCS (N = 262)

Item	Factor		
	1	2	3
1. I lead others to accomplish a goal.	0.57	0.09	-0.16
2. Team members can count on me.	0.69	0.01	0.03
3. Others can count on me to accomplish a goal.	0.79	-0.10	-.07
4. I put all my energy into accomplishing my goals.	0.60	0.05	0.13
5. I push myself.	0.60	0.01	0.10
6. I listen to what others say.	0.04	0.45	0.18
7. I think about how others see things.	0.15	0.50	0.06
8. I enjoy learning about different cultures.	-0.01	0.84	-0.09
9. I take time to learn about different cultures.	-0.07	0.82	-0.01
10. I can adjust to change.	0.08	-0.02	0.70
11. I am open to change.	-0.12	0.02	0.85
Eigenvalue	4.15	1.51	1.77
Percent variance	37.71	13.74	10.70

Table 1 continued

Item	Factor		
	1	2	3
M(SD)	3.70(0.91)	3.97(1.00)	3.58(1.10)
α	0.77	0.76	0.73

Note. Pattern Matrix from the Principal Axis Factor Analysis with a Promax Rotation.

The internal consistency estimates (α) for the factors indicated that each of the three factors demonstrated adequate internal consistency. Specifically, Factor 1 (Leadership and Responsibility) had a Cronbach's alpha coefficient of 0.77, Factor 2 (Working with Others Effectively) had a Cronbach's alpha coefficient of 0.76, and Factor 3 (Adaptability) had a Cronbach's alpha coefficient of 0.73. The entire scale also demonstrated high internal consistency ($\alpha = 0.83$). The intercorrelations among the three factors were statistically significant and ranged from 0.36 to 0.42, representing moderate correlations in explaining the total variance in the concept of life and career skills for the 21st Century.

21C-CE

The EFA of the six-item scale measuring the 21st century classroom environment yielded a one-factor solution (eigenvalue = 3.51) that accounted for 58.54% of the total variance. All of the 6 items loaded on the one factor sufficiently, with factor loadings ranging from 0.65 to 0.76. The full list of items and factor loadings are available in Table 2. The overall reliability of the measure was determined via Cronbach's alpha of .86. Inter-item correlations ranged from .41 to .60 and were each statistically significant.

Table 2. Factor loadings and descriptive statistics for the 21C-CE (N = 262)

Item	Factor Loading	<i>M</i>	<i>SD</i>
1. My teachers give me the opportunity to lead groups	0.67	3.26	1.35
2. My teachers help me organize my time.	0.65	3.04	1.42
3. My teachers give me time to work with other students.	0.70	3.68	1.26
4. My teachers encourage me to ask questions.	0.74	3.75	1.27
5. My teachers encourage me to consider the opinions of others.	0.76	3.43	1.28
6. My teachers help me set goals for myself.	0.74	3.72	1.33

Note. All items loaded on a single factor. Eigenvalue = 3.51, Percent Variance Explained = 58.54. Scale *M* = 3.56; *SD* = 0.94.

Student Perceptions

Mean scores were calculated for each of the three subscales within the 21C-LCS, as well as for the scale in its entirety. Higher mean scores indicated higher reported use of 21st century life and career skills. The mean scores for each of the subscales suggested that participants in this study had moderately high perceptions of their skills in relation to leadership and responsibility (*M* = 3.70; *SD* = 0.91), working with others effectively (*M* = 3.97; *SD* = 1.00), and adaptability (*M* = 3.58; *SD* = 1.10). Participants reported the most positive perceptions of their skills for working with others effectively. All three subscales were significantly and positively correlated (Table 3), indicating that students who reported greater skill in one area also reported greater skill in the other two areas. Likewise, participants in this sample noted that their classroom somewhat supported their learning of 21st skills (*M* = 3.56; *SD* = 0.94). Scores on the 21C-CE were significantly and positively related to scores on the 21C-LCS as well.

Table 3. Correlation matrix of 21C-LCS subscales and 21C-CE (N = 262).

Variable	Leadership & Responsibility	Working with Others	Adaptability	Classroom Environment
Leadership & Responsibility	--			
Working with Others	.41*	--		
Adaptability	.42*	.36*	--	
Classroom Environment	.51*	.48*	.41*	--

Note. **p* < 0.01

Discussion

The results of this study indicate that the 21C-LCS and the 21C-CE are brief, psychometrically sound measures of two distinct aspects of 21st Century Skills in educational settings. The 21C-LCS assesses students' perceptions of the following critical skill areas: (1) Leadership and Responsibility; (2) Working with Others Effectively; and, (3) Adaptability. Additionally, the 21C-CE is a reliable measure of students' perceptions of the ways in which their classroom environments support their development of 21st century life and career skills.

Within the 21C-LCS, *leadership and responsibility* explained the most variance in 21st century life and career skills (37.71%) and measures students' perceptions of their ability to lead others and accomplish goals. *Working with others effectively* explained 13.74% of the total variance. This factor measures students' perceptions of the extent to which they listen to others and consider differing perspectives and cultures. Participants in this study reported the most skill in this area, compared to the other two areas measured by the 21C-LCS. *Adaptability* also emerged from the analysis and is a measure of students' perceived adjustment and openness to change. However, it was only comprised of two items and explained only 10.70% of the total variance. The small amount of explained variance may be an indication that adaptability is somewhat different from leadership and responsibility and working with others effectively. The results did not support the inclusion of several other life and career skills identified in previous frameworks, such as initiative and self-directed learning and time management. Initiative/self-directed learning and time management appear distinct from leadership and responsibility and working with others effectively as the latter characteristics occur within the context of collaboration. This could also explain the lower percent of explained variance for the adaptability items.

The 21C-CE measures students' 21st century learning environment experiences. Specifically, it assesses students' perceptions of having opportunities to work with others and consider the opinions of others. It also measures students' perceptions of having opportunities or being encouraged to set goals, organize time, and ask questions. Although it is a subjective method of evaluation, the 21C-CE measures an important domain of 21st century learning environments, which is having the opportunity to practice 21st century life and career skills. Students' perceptions of their learning environments was positively related to their perceptions of their own 21st Century skills, suggesting that more attention to understanding classroom environments may be warranted.

Limitations

Additional scale development procedures, such as a confirmatory factor analysis, will provide more information about the psychometric properties of these measurement tools. Moreover, these measures are limited in that they assess

students' perceptions of their own skills and classroom environments. Generalizability is another limitation as the sample relied on students from one school and included only one age group (i.e., middle school). Finally, factor three of the 21C-LCS warrants more investigation as it only had two items, explained 10.70% of the variance, and had the lowest internal consistency reliability; however, it still seemed conceptually distinct from the other two factors. It may be an important component of 21st century life and career skills that has not been investigated previously.

Implications

This study is an important step in understanding 21st century life and career skills and 21st century learning environments. Additional psychometric analysis will be useful in determining the underlying factor structure of these measures, as well as the ways in which the factors interrelate. Future research also is needed to assess the construct validity of the 21C-LCS. For example, it will be important to understand the ways in which the 21C-LCS relates to other existing measures of non-cognitive skills, such as the VIA-Y. Likewise, future research may utilize other methods to assess 21st century life and career skills, such as through observation (Singleton & Straits, 2005). Finally, more examination of 21st century learning environments is needed. It is likely that other critical aspects of learning environments are necessary to developing 21st century skills, such as access to technology, physical spaces that promote individual and group work, and educator professional development on integrating 21st century skills practice into the classroom.

This study poses implications for practice with children and youth as well. Although not often emphasized, school social workers may perform interventions at multiple levels to foster and advocate for 21st century life and career skill development and assessment among youth. For instance, practitioners can lead efforts to utilize such tools in school and community programming (e.g., afterschool programs) to facilitate continuous improvement processes geared toward developing these skills in youth. Including these measures in progress monitoring practices will help schools and other programs assess youths' needs and develop interventions that target 21st century skills. Additionally, social workers play a key role by collaborating with others, such as teachers and related service providers, to cultivate learning opportunities that enhance 21st century skill development. This study provides tools for school social workers to provide guidance and consultation to school leaders and other teachers focused on integrating 21st Century skills in the classroom. Finally, social workers in schools may advocate for policies that support teaching and learning methods that facilitate the development these skills. Ultimately, enhancing 21st century skills better prepares youth for the current workforce; thus, these skills may prove vital as youth-serving agencies and organizations strive to address skill and education gaps evident among children and youth. It is especially important for school social workers to emphasize a holistic, or whole-child, approach to youth development,

including both academic and non-academic priorities. The measures in this study point, not only to ways of measurement, but also to operationalized constructs that are useful in articulating 21st century skills and learning environments to multiple stakeholders.

Conclusion

To enhance success in adulthood, today's high school and college graduates should be equipped with both academic skills and life and career skills. Therefore, it is essential for schools and community-based youth-serving organizations to consider student mastery of noncognitive skills, particularly as this area becomes an emerging priority in education reform and in the global marketplace. Assessment of such skills is critical; however, few tools exist to measure 21st century skills specifically. This study offered two brief, psychometrically sound measures of 21st century life and career skills and learning environments that will be useful in developing and monitoring learning opportunities for children and youth. Students reported moderately high perceptions of their own skills, yet targeted programming and interventions may enhance students' ability to utilize these skills in multiple settings. More research also will illuminate the ways in which 21st century skills may be similar to or different from other critical noncognitive skills.

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